

Claims

- [c1] A communication receiver comprising:
 - a data receiver receiving at least one pulse-position modulated signal;
 - a clock circuit separating a reference clock signal into a plurality of coordinating clock signals;
 - a plurality of time integrators gated to generate a plurality of time-integrated signals in response to said at least one pulse-position modulated signal and said plurality of coordinating clock signals; and
 - a combiner forming a demodulated signal from said plurality of time-integrated signals.
- [c2] A communication receiver as in claim 1 wherein said data receiver comprises at least one electrical transducer.
- [c3] A communication receiver as in claim 2 wherein said at least one electrical transducer comprises at least one photodiode.
- [c4] A communication receiver as in claim 1 further comprising a transimpedance amplifier converting said reference clock signal from being in the form of a current signal

into a voltage swing signal.

- [c5] A communication receiver as in claim 1 further comprising a transimpedance amplifier converting said at least one pulse-position modulated signal from being in the form of a current signal into a voltage swing signal.
- [c6] A communication receiver as in claim 1 further comprising a clock receiver receiving said reference clock signal.
- [c7] A communication receiver as in claim 6 wherein said clock receiver comprises at least one electrical transducer.
- [c8] A communication receiver as in claim 7 wherein said at least one electrical transducer comprises at least one photodiode.
- [c9] A communication receiver as in claim 1 further comprising a clock recovery circuit recovering said reference clock signal.
- [c10] A communication receiver as in claim 9 wherein said clock recovery circuit comprises a phase lock loop.
- [c11] A communication receiver as in claim 1 further comprising a one-shot timer circuit widening pulses within said reference clock signal.

- [c12] A communication receiver as in claim 1 further comprising a one-shot timer circuit widening pulses within said at least one pulse-position modulated signal.
- [c13] A communication receiver as in claim 1 further comprising a plurality of switches coupled to said plurality of time integrators, said combiner forming said demodulated signal in response to state of said plurality of switches.
- [c14] A communication receiver as in claim 1 wherein said combiner sums at least a portion of said plurality of time-integrated signals to form said demodulated signal.
- [c15] A communication receiver as in claim 1 wherein said plurality of time integrators are gated to begin integration in response to the plurality of coordinating clock signals.
- [c16] A communication receiver as in claim 1 wherein said plurality of time integrators are gated to cease integration in response to said at least one pulse-position modulated signal.
- [c17] A communication receiver as in claim 1 wherein said plurality of time integrators integrate a constant input value in response to said at least one pulse-position modulated signal and said plurality of coordinating clock

signals.

- [c18] A communication receiver as in claim 17 wherein said plurality of time integrators comprise at least one current source providing said constant value.
- [c19] A communication receiver as in claim 1 wherein said plurality of time integrators comprise:
 - at least one integration switch;
 - at least one hold switch; and
 - at least one reset switch.
- [c20] A communication system as in claim 19 wherein said plurality of time integrators perform integration in response to said at least one integration switch.
- [c21] A communication system as in claim 19 wherein said plurality of time integrators hold a voltage value in response to said at least one hold switch.
- [c22] A communication system as in claim 19 wherein said plurality of time integrators reset a voltage value to a nominal value in response to said at least one reset switch.
- [c23] A communication system comprising:
 - a transmitter generating at least one pulse-position modulated signal; and

a communication receiver comprising;
a data receiver receiving said at least one pulse-position modulated signal;
a clock circuit separating a reference clock signal into a plurality of coordinating clock signals;
a plurality of time integrators gated to generate a plurality of time-integrated signals in response to said at least one pulse-position modulated signal and said plurality of coordinating clock signals; and
a combiner forming a demodulated signal from said plurality of time-integrated signals.

[c24] A communication receiver as in claim 23 further comprising a clock recovery circuit recovering said reference clock signal.

[c25] A communication receiver as in claim 23 further comprising a one-shot timer circuit widening pulses within said reference clock signal.

[c26] A communication system comprising:
a first station having a transmitter generating at least one pulse-position modulated signal; and
a second station having a communication receiver comprising;
a data receiver receiving said at least one pulse-position modulated signal;

a clock circuit separating a reference clock signal into a plurality of coordinating clock signals;
a plurality of time integrators gated to generate a plurality of time-integrated signals in response to said at least one pulse-position modulated signal and said plurality of coordinating clock signals; and
a combiner forming a demodulated signal from said plurality of time-integrated signals.

- [c27] A method of extracting information from pulse-position modulated signals comprising:
receiving at least one pulse-position modulated signal;
separating a reference clock signal into a plurality of clock signals;
gating a plurality of time integrators to generate a plurality of time-integrated signals in response to said at least one pulse-position modulated signal and said plurality of clock signals; and
generating a demodulated signal from said plurality of time-integrated signals.
- [c28] A method as in claim 27 further comprising receiving said reference clock signal.
- [c29] A method as in claim 27 further comprising recovering said reference clock signal from said at least one pulse-position modulated signal.

- [c30] A method as in claim 27 further comprising converting said reference clock signal from a current signal into a voltage swing signal.
- [c31] A method as in claim 27 further comprising converting said at least one pulse-width modulation signal from a current signal into a voltage swing signal.
- [c32] A method as in claim 27 further comprising widening pulses within said reference clock signal.
- [c33] A method as in claim 27 further comprising widening pulses within said at least one pulse-position modulated signal.
- [c34] A method as in claim 27 wherein separating said reference clock signal into a plurality of clock signals comprises generating said plurality of clock signals out-of-phase from each other.
- [c35] A method as in claim 27 wherein gating said plurality of time integrators comprises beginning integration in response to the plurality of coordinating clock signals.
- [c36] A method as in claim 27 wherein gating said plurality of time integrators comprises ceasing integration in response to said at least one pulse-position modulated signal.

[c37] A method as in claim 27 wherein gating said plurality of time integrators comprises integrating a constant current in response to said at least one pulse-position modulated signal and said plurality of coordinating clock signals.

[c38] A method of demodulating communication signals comprising:
receiving at least one pulse-position modulated signal;
separating a reference clock signal into a plurality of clock signals;
gating a plurality of time integrators to generate a plurality of time-integrated signals comprising;
beginning integration in response to the plurality of coordinating clock signals;
integrating a constant value; and
ceasing integration in response to said at least one pulse-position modulated signal; and
generating a demodulated signal from said plurality of time-integrated signals.

[c39] A method as in claim 38 further comprising recovering said reference clock signal.

[c40] A method as in claim 38 further comprising widening pulses within said reference clock signal.

